UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
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April 18, 2019

Charles W. Munce, P.E.
GHD Services Inc.
5551 Corporate Boulevard, Suite 200
Baton Rouge, Louisiana 70808

RE: San Jacinto River Waste Pits Superfund Site
CERCLA Docket No. 06-02-18
Draft Second Phase Pre-Design Investigation Work Plan

Dear Mr. Munce,

The Environmental Protection Agency along with other agencies have reviewed the Draft Second Phase Pre-Design Investigation Work Plan. Based on the review, the following comments are provided.

Please contact me if you have any questions or would like to schedule a meeting to discuss the comments. You may reach me at 214-665-6749.

Sincerely,

Gary A. Baumgarten
Project Manager

Enclosure

cc: Katie Delbecq, TCEQ
Bob Allen, Harris County
Trae Camble, Port of Houston
Paul Schroeder, U.S. Army Engineer Research and Development Center

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EPA Review Comments
Draft Second Phase Pre-Design Investigation Work Plan
San Jacinto River Waste Pits Superfund Site

General Comments

1. **Remedy Implementation Approach - Northern Impoundment**
   a. The Draft Second Phase Pre-Design Investigation Work Plan (Work Plan) presents a preliminary technical approach for the remedial action (RA) in the Northern Impoundment. The approach proposed in the Work Plan consists of using data from the pre-design investigations to determine a prescribed waste excavation volume such that confirmation during the remedy implementation is engineered to elevation measurements rather than utilizing analytical confirmation samples. The Work Plan proposes collecting additional data to identify removal volumes using a ½ acre certification unit (CU).

      The Work Plan discusses that a pre-excavation CU approach provides critical information necessary for design of the best management practice (BMP) needed for conducting the remedial action. EPA recognizes that minimizing reliance on confirmatory samples has the benefit of reducing the time an excavation area is open which is an important design consideration.

      While many aspects of the RA approach presented in the Work Plan have merit, EPA will require confirmation sampling in CUs to verify that waste exceeding the ROD cleanup level of 30 ng/kg $TEQ_{DF,M}$ has been removed. Issues expressed by multiple reviewers about using the pre-excavation approach presented in the Work Plan include:

      - During the June 13, 2018, TWG meeting, it was EPA's understanding that attainment of the cleanup levels in the excavated areas would be verified using ¼ acre CUs for the north impoundment. The Work Plan proposes ½ acre CUs with only pre-remediation samples. This is not consistent with previous TWG discussions;
      - The use of thiessen polygons to describe excavation prisms are not the appropriate tool for a site where cleanup design and sequencing will be dictated by chemical, physical, and operational constraints.

        Thiessen polygon development is an empirically based methodology which exactly preserves analytical data values, and is based on the assumption that the value observed at a sampling station applies uniformly throughout the thiessen polygon area associated with that sampling station.

        The distribution of the waste in the northern impoundment is not uniform. Sampling during the Remedial Investigation shows variation in $TEQ_{DF,M}$ over short distances. In addition, the elevation of the bottoms of the northern impoundment are not known to be uniform in depth.

- A two-foot core section gives a coarse resolution, far less than can be expected from vertical accuracy of excavation equipment.

In conclusion, the Work Plan should gather sufficient data to accurately determine the volume of waste to be removed and define the maximum hydraulic head differential across the BMP. To gather this information, EPA believes it is appropriate to collect and analyze cores in the ½ acre polygons presented on Figure 2-1 at 2-foot intervals to a depth of 18 feet. EPA's expectation is that excavations will be verified during RA using ¼ acre CUs in the north impoundments

The Work Plan should consider adding organic matter to the list of parameters to be analyzed. It may be correlated with waste content/contaminants and is rapid and inexpensive analysis.

b. EPA recognizes that the location of the BMP (e.g., engineered barrier) has not been determined and that information collected during the pre-design investigations will inform the decision.

However, to ensure that adequate geotechnical as well as chemical data is collected, the Work Plan needs to indicate on a figure a conceptual BMP configuration. It is important to collect and analyze samples for dioxin/furans to ensure that the area where a BMP is placed does not occur where soil concentrations are above the ROD cleanup level of 30 ng/kg $TEQ_{DF,M}$.

2. **Remedy Implementation Approach - Southern Impoundment**
Similar to the reasons discussed above, EPA will require confirmation sampling in CUs to verify that waste exceeding the ROD cleanup level of 240 ng/kg $TEQ_{DF,M}$ has been removed.

During the June 13, 2018, TWG meeting, it was EPA's understanding that excavations would be verified using ½ acre CUs for the southern impoundments. As discussed in the following specific comments, the Phase 2 sampling in the southern impoundment should be based on a ½ acre CU and an investigation approach similar to the one used during the Phase 1 Pre-Design Investigation should be used.

3. **Remedy Implementation Approach – Sand Separation Area**
The Work Plan discusses that deposition of sediment from uncontaminated upstream sources is the primary physical process contributing to monitored natural recovery (MNR) in the Sand Separation Area (SSA). The Work Plan focuses on the evaluation of the upper portion of the biologically active zone (BAZ) where risk to benthic organisms is the highest.

The primary indicator of natural recovery of COC concentrations in sediment is the decline in concentrations over time. In addition, it is important to understand the processes driving changes in COC concentrations and to understand whether they can be reasonably anticipated to occur in the future. The Work Plan should focus on determining the vertical and lateral extent of dioxin/furan concentrations in the SSA. In addition, the Work Plan should develop lines of evidence to better establish the physical processes of deposition/erosion occurring in the SSA.

4. EPA recognizes that the Work Plan was developed prior to validation/receipt of all data from the Phase 1 Pre-Design Investigation. All data that will be used in the remedial design will have to be validated.

Specific Comments

1. Page 3, Northern Impoundments, 5th Bullet: In-situ stabilization prior to removal is specified to avoid the need for double-handling of material. There is significant advantage to minimizing the time the excavation is open, and in-situ stabilization may significantly extend this time due to the time required for in-situ mixing, cure time, testing, etc. An evaluation of the schedule impacts should be completed before it is determined that in-situ stabilization is the preferred method.

2. Page 7, Section 2.2: The last paragraph states that the dioxin concentrations exceeded 30 ng/kg at SJSB016 and SJSB038 in 4 feet to 11 feet depth interval. Please note that the dioxin concentration at SJSB014 also exceeded 30 ng/kg.

3. Page 7, Section 2.2.1: SJSB032 and SJSB033, which were collected in the western berm of the western impoundment, have levels of dioxins/furans above the ROD cleanup value of 30 ng/kg $TEQ_{DF,M}$. No additional sampling is proposed west of the berm. Information about the dioxin/furan levels west of these locations needs to be collected to determine if there is waste material outside of the western berm and confirm that placement of the BMP is not located in an area with dioxin/furan levels above the ROD cleanup value.

4. Page 9, Section 2.2.2: Locations for additional soil borings for vertical delineation include SJSB036. It appears that vertical delineation is also required at SJGB011, SJGB013, SJSB037 and SJSB038. Please clarify

5. Page 12, Section 2.4.1: The Phase 1 geotechnical analysis included several advanced tests including consolidated undrained triaxial shear strength, direct shear strength testing, one-dimensional consolidation testing, and bulk density testing (PDI-1 Work Plan, p. 22). However, this Work Plan proposes only one advanced test (unconsolidated undrained triaxial shear strength) in Section 2.4.2.4. Please specify the reason for not proposing other advanced tests.

6. Page 11, Section 2.4: Figures 2.3 and 2.4 do provide useful information but it would have been more useful to plot Liquidity Index and SPT N-values against depth to evaluate if the index testing and blow counts are providing consistent information regarding consolidation history and strength. The liquidity indices can also provide valuable information in identifying if sensitive clays may be present that need to be considered in design. Similarly, activity can be plotted for clays where hydrometer and Atterberg limits data are available to assist in evaluating stratigraphy by differentiating between different clay mineralogy characteristics.

On Figure 2-2, the locations of prior geotechnical borings and the anticipated locations of the BMP (e.g., cofferdam) should be added to better assess the adequacy of the proposed geotechnical investigation program.

7. Page 12, Section 2.4.2.2: The Work Plan states that the goal of the geotechnical investigation is to evaluate the geotechnical characteristics and strength of subsurface soils. This leaves out the importance of the hydraulic characteristics and potential for internal erosion of the soils which is a critical performance criterion for stability of a water barrier system. Structural stability of a BMP is irrelevant if internal erosion can wash away the supporting soils. Section 2.5 discusses required analyses of expected inflows but does not discuss analysis of internal erosion potential, which is not normally included in hydrogeological evaluations. The stratigraphy descriptions indicate the presence of sands and silts that can be subject to internal erosion, so internal erosion should be evaluated in the geotechnical evaluation.

8. Page 13, Section 2.4.2.4, Analytic Approach:
    a. The one strength test listed is U-U triaxial tests. It is noted that the results of U-U triaxial test are heavily reliant on undisturbed samples that are carefully sampled, transported, and prepared prior to testing. On difficult geotechnical sites with complex stratigraphy and consolidation history, these tests are often done in a framework that includes consolidated-undrained (C-U) triaxial tests and consolidation tests to put them within an accurate site consolidation and soil strength framework as discussed above. It usually requires a fair number of U-U tests combined with index testing to create a statistically valid soil strength model for the site. Simply relying on a handful of U-U tests alone can provide inaccurate soil strength parameters that can over- or under-estimate soil strength. It is recommended to use the existing index testing and SPT data to better evaluate the soil consolidation and strength characteristics as discussed above to evaluate a complete geotechnical testing program.
    b. One of the tests that can be performed in the borings during the sampling program to assist in this is vane shear testing. Vane shear is very useful in evaluating in situ peak and residual shear strengths of clays and often can avoid the impacts of sample disturbance during sampling, transporting, and preparation of triaxial samples and so is a useful check on the laboratory strength data.
    c. The proposed program does not include in situ testing using cone penetrometer testing (CPT) to supplement the borings. Consideration should be given to using CPT to assist in stratigraphic identification and potential variations of soil strength and hydraulic properties between the various stratigraphic units. Porewater pressure dissipation tests can provide valuable information about local hydraulic parameters as well as identifying if soils are dilative or contractive for use in soil strength models. CPT is very valuable in sands, silts, and clays in delineating stratigraphy, providing drained and undrained soil strength parameters, and providing data on hydraulic properties and conditions. CPT testing should also be considered to gather additional data directly along the alignment of the anticipated BMP.

9. Page 13, Section 2.4.2.5: This section states that there are no industry-standard acceptance criteria for geotechnical engineering tests. Strictly speaking, this is correct. However, it is long-standing common industry practice to evaluate the geotechnical testing within the framework of a geotechnical strength and consolidation model framework (e.g. SHANSEP or critical state soil mechanics) to evaluate if the geotechnical test results are providing expected or unexpected results, and if sample disturbance or other factors may have impacted the geotechnical testing and can cause erroneous interpretations if the data are used without adjustment. So geotechnical testing is generally selected to provide complementary data that can be used to confirm and/or adjust results from different tests.

10. Page 14, Section 2.6: This section discusses data needs for the excavation and backfill process for the northern impoundment. Backfilling is not discussed in the preliminary technical approach discussed in Section 1.1.4. If backfilling is being considered, the Work Plan should identify necessary sampling to design the backfilling plan.

11. Page 14, Section 2.6.1: It is recommended that all easements (upland and in-water) and channel lanes in proximity to the impoundments and staging areas also be mapped as part of the proposed utility survey.

12. Page 18, Section 3.2.2: As discussed in General Comment 2, the Phase 2 sampling in the southern impoundment should be based on a ½ acre CU and the investigation approach implemented during the Phase 1 Pre-Design Investigation should be used.

    Please update this section to reflect the sampling approach implemented during the Phase 1 Pre-Design Investigation. Figures 3-1 and 3-2 should be revised to identify additional sampling locations based on the Phase 1 Pre-Design data. Please place a ½ acre grid as a watermark so that new sampling locations relative to the ½ acre CU can be visually assessed.

13. Page 19, Section 3.2.2.3: The cleanup level of 240 ng/kg $TEQ_{DF,M}$ is a depth-weight average over 10 feet. Therefore, the samples to be analyzed should be a 10-foot composite comprised of soil from the two-foot sample collection intervals.

14. Page 23, Section 4.1: This section discusses three processes that could contribute to natural recovery in the Sand Separation Area (SSA). Deposition of sediment is the primary physical process contributing to monitored natural recovery (MNR). Evaluation of chemical and biological processes is not recommended since they do not appear to be major contributors to natural attenuation at the Site.

15. Page 24, Section 4.2.1: The Work Plan states that additional data will be collected to refine the model for the SSA and estimate deposition.

    EPA does not believe it is necessary to refine the hydrodynamic and sediment transport modeling that was conducted during the RI/FS.

Historic deposition rates in the SSA could be determined by cesium-137, lead-210, and site COC profiles for dating layers in the profile. This is similar to what was done during the Remedial Investigation.

16. Page 24, Section 4.2.2: To determine baseline conditions for monitoring natural attenuation, additional sampling locations and sampling depths need to be included in the Work Plan. Currently there is only one sample from the Remedial Investigation (SJNE032) that describes the lateral and vertical extent of dioxin/furan levels in the SSA.

    The SSA depicted on Figure 34 of the Record of Decision is approximately 4.5 acres. To determine baseline MNR conditions in the SSA, a minimum of nine sample locations should be included in the Work Plan. Nine sample locations are considered appropriate based on ½ acre spacing. Since burial is likely the dominant natural recovery process, coring should be conducted to a depth with interval sectioning such that radiotracer and dioxin profiles can be discerned.

17. Appendix A, Page 7, Section 3.5.3, Porewater: Please describe repairs to the cap if porewater is collected from a temporary excavation.

18. Appendix B, Table B-2: This table did not specify TCLP testing for dioxins/furans and provide quantitation limits, even though Table B-1 proposed TCLP testing for dioxins/furans for 112 samples. Please update Table B-2 to specify TCLP testing for dioxins/furans and provide the quantitation limits.

19. Appendix C, Emergency Contact List: Please use the following contact information for EPA: EPA Region 6 Emergency Response 24-hour 866-372-7745

    The GHD contact in the third column on page 2 appears twice. It is unclear if the contact is intended to appear twice.

20. Appendix C: In addition to the Safety Data Sheets (SDS) provided in this appendix, information similar to SDS information should be included for dioxin/furans and PCBs.

21. Appendix D, Section 5: The Severe Weather Preparation section discusses executing preparation phases when winds exceed 50 mph. Localized flood events and heavy rains can impact the Lake Houston watershed result in releases from Lake Houston. This is a common threat to the site. Please update this section to describe rainfall events that would cause the preparation phases to be implemented.

    Phase II triggers backfilling any open excavations. There are no specific details how the areas will be backfilled to prevent a release (material used to backfill and will area be covered).

22. Appendix D, Section 6: Evacuation Routes and Procedures: This Section identifies a minor release as small spills of low toxicity and major releases as large spills of high toxicity (requires complete site evacuation). This Section should quantify or specify what constitutes a small/large spill and low/high toxicity.

Editorial Comments

1. Page 4, Section 1.2.2.2 and Page 7: Section 1.2.2.2, bottom of p. 4 (and Section 3.6) lists only two task bullets for the Southern Impoundments, but Section 3 in fact has four tasks (area and volume of waste, characteristics of waste, geotechnical data, and topographic and utility data). All four tasks should be bulleted in Section 1.2.2.2 and in Section 3 (bottom of p.16-top of p. 17).

2. Page 7, Section 2.2: Sample numbers are not consistent with those listed in Figure 2-1. Per Figure 2-1, SJSB032, SJSB033, SJSB036 and SJSB037 are located in the western cell and SJSB035 is located on the central berm.

3. Table 2-2: In the table header, locations SJSB036 and SJSB037 should be labeled as "west" (not east) and SJSB038 should be labeled as "east" (not west).

4. Table 3-1: Sample depths were labelled as either 9-9 feet or 10-10 ft bgs, while they all are composites of samples collected from 0 to 10 feet bgs.